Your notes

KS3 Science: revision notes

B2.2 Respiration and photosynthesis

Contents

1. Aerobic respiration
2. Anaerobic respiration
3. Photosynthesis
4. Plant adaptations
5. Key terms
6. Quick questions
7. What to do next

Aerobic respiration

- Respiration releases energy from **glucose**. It happens in every living cell, all the time.
- **Aerobic respiration** uses oxygen and happens in the **mitochondria**: **glucose** + oxygen → carbon dioxide + water (energy is released).
- The energy is used for movement, growth, repair and keeping warm.
- During exercise, breathing rate and heart rate rise to bring more oxygen and **glucose** to the muscles and remove carbon dioxide.

Anaerobic respiration

- **Anaerobic respiration** happens without oxygen and releases much less energy.
- In human muscles during hard exercise: **glucose** → **lactic acid**. **Lactic acid** causes muscle fatigue and cramp. Afterwards, you keep breathing hard to repay the oxygen debt.
- In yeast (**fermentation**): **glucose** → ethanol + carbon dioxide. The carbon dioxide makes bread rise, and the ethanol is the alcohol in beer and wine.
- A healthy lifestyle (exercise, a good diet and not smoking) keeps the heart and lungs working well.

Photosynthesis

- Plants make their own food by **photosynthesis**: carbon dioxide + water → **glucose** + oxygen. Light energy is absorbed by **chlorophyll** in the chloroplasts.
- Plants use the **glucose** for respiration, store it as starch, and use it to make cellulose for cell walls and proteins for growth.
- Test a leaf for starch with iodine: it turns blue-black if starch is present.

- Pondweed gives off bubbles of oxygen. Moving a lamp closer (more light) increases the number of bubbles, until something else, such as carbon dioxide or temperature, limits the rate.

Plant adaptations

- Leaves are broad and flat (large surface area to absorb light), thin (so gases don't have far to travel), full of **chlorophyll**, and have **stomata** (tiny holes) to let carbon dioxide in and oxygen out.
- Plants are adapted to their habitats: cacti have spines instead of leaves and thick stems that store water.
- A few plants, such as dodder, can't photosynthesise and take their food from other plants.
- Biodomes create controlled environments so plants from different climates can grow.

Key terms

Aerobic respiration	Respiration using oxygen, releasing lots of energy.
Anaerobic respiration	Respiration without oxygen, releasing less energy.
Glucose	A sugar that is broken down in respiration.
Mitochondria	Where aerobic respiration happens in a cell.
Lactic acid	Made in muscles during anaerobic respiration.
Oxygen debt	The extra oxygen needed after exercise to break down lactic acid.
Fermentation	Anaerobic respiration in yeast, making ethanol and carbon dioxide.
Photosynthesis	Plants making glucose from carbon dioxide and water, using light energy.
Chlorophyll	The green pigment that absorbs light for photosynthesis.
Chloroplast	The part of a plant cell where photosynthesis happens.
Stomata	Tiny holes in a leaf that let gases in and out.
Limiting factor	Something that stops the rate of photosynthesis increasing any more.

Quick questions

Cover the answers and test yourself: remembering is what makes it stick.

1. What is the word equation for aerobic respiration?
2. Where in a cell does aerobic respiration happen?
3. What is made during anaerobic respiration in human muscles?
4. Why does your breathing rate increase during exercise?

Your notes

5. What does yeast produce during anaerobic respiration?
6. Why does bread dough rise?
7. What is the word equation for photosynthesis?
8. What absorbs the light energy for photosynthesis?

Answers

1. Glucose + oxygen → carbon dioxide + water
2. Mitochondria
3. Lactic acid
4. To get more oxygen to the muscles and remove carbon dioxide
5. Ethanol and carbon dioxide
6. Yeast makes carbon dioxide gas
7. Carbon dioxide + water → glucose + oxygen
8. Chlorophyll

What to do next

Practise 14 questions on this topic

Try 4 exam questions, with mark schemes

Read the lesson, one step at a time

Free revision for GCSE and KS3 at lycolearn.co.uk. Some notes are for one exam board only, and say so in brackets.

Your notes